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10/594,144	09/26/2006	Kohji Ohno	06265/HG	8896
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EXAMINER				
PATEL, RONAK C				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

# Office Action Summary

**Application No.**

10/594,144

**Applicant(s)**

OHNO ET AL.

**Examiner**

RONAK PATEL

**Art Unit**

1794

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) 10-15 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-9 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 9/26/2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/C)
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_
- Paper No(s)/Mail Date 20060926

### **DETAILED ACTION**

1. Applicant's election of Claims 1-9 in the reply filed on 9/30/2009 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

#### ***Specification***

2. Applicant is reminded of the proper language and format for an abstract of the disclosure.
3. The abstract should be in narrative form and generally **limited to a single paragraph** on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.
4. The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

#### ***Claim Rejections - 35 USC § 112***

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 4, lines 8-9, it is not clear what is meant by the term "derivative" or what compounds are encompassed by this phrase.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –  
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claim 1 is rejected under 35 U.S.C. 102(b) as being unpatentable by Fu et al. ("Preparation of Cross-Linked Polystyrene Hollow Nanospheres via Surface-Initiated Atom Transfer Radical Polymerization", August 09, 2005).
9. Regarding claim 1, Fu discloses hollow nanospheres coated with polystyrene where the surface initiated atom transfer block copolymerization of methyl methacrylate from the silicon oxide-polystyrene nanospheres gives rise to

the silicon oxide-polystyrene-poly(methyl methacrylate) nanospheres and UV degradation of poly (methyl methacrylate) leads to crosslinked polystyrene layer, which is high density polymer brush layer, enclosing the silicon oxide nanoparticles as shown in scheme 1. Given that the polystyrene is attached to the silica nanoparticles by ATRP initiators and given that there is present 2.4 initiators/nm<sup>2</sup> of the particle surface, it is clear that the polymer brush layer is high density as presently claimed.

***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 1-2 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fu et al. ("Preparation of Cross-Linked Polystyrene Hollow Nanospheres via Surface-Initiated Atom Transfer Radical Polymerization", August 09, 2005) in view of Yamamoto et al. ("Surface Interaction Forces of Well Defined, High Density Polymer Brushes Studied by Atomic Force Microscopy. 1. Effect of Chain Length", July, 6, 2000)

12. Regarding claims 1-2, Fu discloses hollow nanospheres coated with polystyrene where the surface initiated atom transfer block copolymerization of

methyl methacrylate from the silicon oxide-polystyrene nanospheres gives rise to the silicon oxide-polystyrene-poly(methyl methacrylate) nanospheres and UV degradation of poly (methyl methacrylate) leads to crosslinked polystyrene layer. However, Fu does not expressly mention that the polymer is high density, whereas, Yamamoto discloses a polymer brush comprised of low-polydispersity poly (methyl methacrylate) (PMMA) chains densely end grafted on a silicon substrate by living radical polymerization wherein these brushes are characterized by an exceptionally high nearly constant graft density approximately  $0.4 \text{ chains/nm}^2$  and wide range of molecular weight of the graft chains (abstract). The motivation of having the density of chains composing the polymer brush layer of  $0.4 \text{ chains/nm}^2$  is to have strong resistance against compression with an extremely high graft density (conclusion, last 3 lines).

13. In light of the motivation of using the polymer brush layer with a density of chains of  $0.4 \text{ chains/nm}^2$  as taught by Yamamoto as described above, it therefore would have been obvious to one of ordinary skill in the art at the time of invention to use the polymer brush layer with such density, include polystyrene polymer brush, in Fu in order to produce hollow nanoparticle having strong resistance to compression.

14. Claims 1-3, 5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walt et al. (US 2002/0172716) in view of Yamamoto et al.

("Surface Interaction Forces of Well Defined, High Density Polymer Brushes Studied by Atomic Force Microscopy. 1. Effect of Chain Length", July, 6, 2000)

15. Regarding claims 1-3, 5 Walt discloses a core-shell microsphere compositions, hollow polymeric microsphere, where the microsphere are characterized as having a polymeric shell with consistent shell thickness (abstract). Walt also discloses that the hollow polymer microsphere were prepared by coating silica microsphere templates with poly(benzyl meth acrylate) using surface initiated controlled/living radical polymerization (para 0039). The microsphere shell is typically obtained from monomers such as styrene or methacrylate and the shell contains a block polymer resulting from the polymerization of these monomers such as styrene-methacrylate, benzyl methacrylate-PMMA, etc. The strength and the durability of the polymeric shell is increased by crosslinking polymer chains (para 0011). As seen in Table 4, the polydispersity or PDI or molecular weight distribution index of the polymer is 1.37 and 1.26 at 6.5 hrs and 14 hrs respectively (para 0086). The benzyl methacrylate is the crosslinkable monomer having a crosslinkable functional group (para 0057) located on the innermost of the polymer brush layer and the PMMA is the non-crosslinkable monomer of the present application, which meets the limitation of claim 3. However, Walt does not expressly mention that the polymer is high density polymer and the density of chains is 0.4 to 1.2 chains/nm<sup>2</sup>. Whereas, Yamamoto discloses a polymer brushes comprised of low-polydispersity poly

(methyl methacrylate) (PMMA) chains densely end grafted on a silicon substrate by living radical polymerization, these brushes are characterized by an exceptionally high nearly constant graft density approximately  $0.4 \text{ chains/nm}^2$  and wide range of molecular weight of the graft chains (abstract). The presence of PMMA makes the density high and density of chains composing the polymer brush layer is  $0.4 \text{ chains/nm}^2$  as taught by Yamamoto. The motivation of having the density of chains composing the polymer brush layer such as PMMA of  $0.4 \text{ chains/nm}^2$  is to have strong resistance against compression with an extremely high graft density (conclusion, last 3 lines).

16. In light of the motivation of using the polymer brush layer with a density of chains of  $0.4 \text{ chains/nm}^2$  as taught by Yamamoto as described above, it therefore would have been obvious to one of ordinary skill in the art at the time of invention to use the polymer brush layer with such density, include benzyl methacrylate-PMMA, in Walt in order to produce hollow nanoparticle having strong resistance to compression.

17. Regarding claim 7, Walt discloses that the hollow microsphere is prepared by providing a microsphere substrate contacting the microsphere substrate with a polymer nanosphere to yield a colloidal assembly heating the assembly to yield a core-shell composite, the microsphere is 3-10 micrometer in diameter and the nanosphere is 100-200 nm (para 0015-0016), which would be less than 5 micrometer as required by claim 7.



18 Claims 4 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Walt et al. (US 2002/0172716) in view of Yamamoto et al. ("Surface Interaction Forces of Well Defined, High Density Polymer Brushes Studied by Atomic Force Microscopy. 1. Effect of Chain Length", July, 6, 2000) and further in view of Watanabe et al. (US 2005/0113505).

19 Regarding claim 4, Walt discloses core-shell microsphere compositions as set forth above, However; regarding claim 4, Walt in view of Yamamoto does not expressly mention that the crosslinkable monomer having a functional group selected from the group consisting of epoxyalkylene group, an aminoalkylene group, an oxetanylalkylene and a cinnamoylalkylene. Whereas, Watanabe et al. discloses a hollow polymer particles obtained by emulsion polymerizing a crosslinkable polymerizable monomer composition and containing a crosslinkable monomer component and a hydrophilic monomer component (abstract). Example of hydrophilic monomer is N,N'-dimethylaminoethyl methacrylate (para 0057), which corresponds to the functional group such as aminoalkylene group. The motivation for having a functional group such as N,N'-dimethylaminoethyl methacrylate along with the crosslinkable monomer in the hollow particle is to form a hollow particle which is excellent in hardness, mechanical strength, heat resistance and solvent resistance and exhibit high coating property and shielding property (para 0024).

20. In light of the motivation of using the functional group such as N,N'-dimethylaminoethyl methacrylate along with the crosslinkable monomer in the hollow particle as taught by Watanabe as described above, it therefore would have been obvious to one of ordinary skill in the art at the time of invention to use the functional group such as N,N'-dimethylaminoethyl methacrylate of Watanabe in the hollow microsphere of Walt to form a hollow particle which is excellent in hardness, mechanical strength, heat resistance and solvent resistance and exhibit high coating property and shielding property (para 0024).

21. Regarding claim 6, Walt discloses core-shell microsphere compositions as set forth above, However; regarding claim 6, Walt in view of Yamamoto does not expressly mention that the degree of polymerization of the crosslinkable monomer is from 10 to 10000 and the degree of polymerization of the non-crosslinkable monomer block is 10 to 10000. However, Watanabe discloses seed particles which are used in the production of hollow polymer particles (para 0029) and the polymer having a weight average molecular weight of preferably 1000 to 10,000 (para 0031), wherein the polymerizable monomer composition absorbed in seed particles contains a crosslinkable monomer component and a hydrophilic monomer (abstract), the degree of polymerization is same average molecular weight, which meets the limitation of claim 6. Watanabe also discloses that the molecular weight of the polymer can be controlled by the amount of specific chain transfer agent and other chain transfer agents used in the emulsion

polymerization reaction (para 0031). The motivation of having the degree of polymerization in the range of 1000 to 10000 is if it exceeds 15,000 the stability of the reaction system in the emulsion polymerization reaction becomes poor and a coagulated product occurs (para 0032) and if is lower than 500 it is low in ability to absorb the crosslinkable polymerizable monomer composition (para 0033).

22. In light of the motivation of having the average molecular weight of the crosslinkable monomer and non-crosslinkable monomer between 1000 to 10000 as taught by Watanabe, as described above, it therefore would have been obvious to one of ordinary skill in the art at the time of invention to have the average molecular weight between 1000 and 1000 to prevent to lower the stability of the reaction system in the emulsion polymerization reaction to become poor and a coagulated product occurs (para 0032) and to absorb the crosslinkable polymerizable monomer composition (para 0033).

23. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Walt et al. (US 2002/0172716), Yamamoto et al. ("Surface Interaction Forces of Well Defined, High Density Polymer Brushes Studied by Atomic Force Microscopy. 1. Effect of Chain Length", July, 6, 2000) and Maruyama et al. (US 2002/0016418)

24. Regarding claim 8, Walt discloses a core-shell microsphere compositions, hollow polymeric microsphere, where the microsphere are characterized as

having a polymeric shell with consistent shell thickness (abstract). Walt also discloses that the hollow polymer microsphere were prepared by coating silica microsphere templates with poly (benzyl meth acrylate) using surface initiated controlled/living radical polymerization (para 0039). The microsphere shell typical contains styrene, methacrylate and the shell contains a polymer resulting from the polymerization of one or more monomers selected from styrene-methacrylate, benzyl methacrylate-PMMA, poly methyl methacrylate (PMAA) would be a non-crosslinkable monomer and would correspond to formula 56 of claim 8. The strength and the durability of the polymeric shell is increased by crosslinking polymer chains (para 0011). The benzyl methacrylate will be the crosslinkable monomer having a crosslinkable functional group located on the innermost of the polymer brush layer and the PMMA will be non-crosslinkable monomer of the present application, which meets the limitation of claim 3. However, Walt does not expressly mention that the polymer is high density polymer brush layer and the crosslinkable functional group represent by the formula 54 or 55. Whereas, Yamamoto discloses a polymer brushes comprised of low-polydispersity poly (methyl methacrylate) (PMMA) chains densely end grafted on a silicon substrate by living radical polymerization, these brushes are characterized by an exceptionally high nearly constant graft density approximately  $0.4 \text{ chains/nm}^2$  and wide range of molecular weight of the graft chains (abstract). The presence of PMMA makes the density high and density of

chains composing the polymer brush layer is  $0.4 \text{ chains/nm}^2$  as taught by Yamamoto. Maruyama discloses a coating composition curable by actinic radiation or heat or both comprising a polymer containing an alkoxysilyl group, a cationic polymerization initiator and cationic reactivity compound (abstract), Maruyama also discloses a polymerizable monomers include those having a cationic reaction functional group such as 3-methyl-3-methacryloyloxy methyloxetane (para 0021), Which corresponds to the formulae 53-54 of the present invention. The motivation of using the high density polymer brushes is to have strong resistance against compression with an extremely high graft density (conclusion, last 3 lines) and motivation of using the crosslinkable functional group such as 3-methyl-3-methacryloyloxy methyloxetane in the coating composition is to form a curable coating composition that has desirable characteristics including low viscosity, good workability, good surface curing properties and can provide a cured film having high hardness (para 0001)

25. In light of the motivation of using the polymer brush layer with a density of chains of  $0.4 \text{ chains/nm}^2$  as taught by Yamamoto and using the crosslinkable functional group such as 3-methyl-3-methacryloyloxy methyloxetane in the coating composition as taught by Maruyama as described above, it therefore would have been obvious to one of ordinary skill in the art at the time of invention to use the polymer brush layer with such density, include benzyl methacrylate-PMMA, in Walt to have strong resistance against compression with an extremely

high graft density and using a crosslinkable monomer with a functional group such as 3-methyl-3-methacryloyloxy methyloxetane of Maruyama and replaced with the crosslinkable functional group such as benzyl-methacrylate of Walt to form a curable coating composition that has desirable characteristics including low viscosity, good workability, good surface curing properties and can provide a cured film having high hardness (para 0001)

26. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Walt et al. (US 2002/0172716), Yamamoto et al. ("Surface Interaction Forces of Well Defined, High Density Polymer Brushes Studied by Atomic Force Microscopy. 1. Effect of Chain Length", July, 6, 2000) and Sato et al. ("Radical and Cationic Polymerizations of 3-Ethyl-3-methacryloyloxymethyloxetane", 2001)

27. Regarding claim 8, Walt discloses a core-shell microsphere compositions, hollow polymeric microsphere, where the microsphere are characterized as having a polymeric shell with consistent shell thickness (abstract). Walt also discloses that the hollow polymer microsphere were prepared by coating silica microsphere templates with poly (benzyl meth acrylate) using surface initiated controlled/living radical polymerization (para 0039). The microsphere shell typical contains styrene, methacrylate and the shell contains a polymer resulting from the polymerization of one or more monomers selected from styrene-methacrylate, benzyl methacrylate-PMMA, poly methyl methacrylate (PMAA) would be a non-crosslinkable monomer and would correspond to formula 56 of

claim 8. The strength and the durability of the polymeric shell is increased by crosslinking polymer chains (para 0011). The benzyl methacrylate will be the crosslinkable monomer having a crosslinkable functional group located on the innermost of the polymer brush layer and the PMMA will be non-crosslinkable monomer of the present application. However, Walt does not expressly mention that the polymer is high density polymer brush layer and the crosslinkable functional group represent by the formula 53, 54 or 55. Whereas, Yamamoto discloses a polymer brushes comprised of low-polydispersity poly (methyl methacrylate) (PMMA) chains densely end grafted on a silicon substrate by living radical polymerization, these brushes are characterized by an exceptionally high nearly constant graft density approximately  $0.4 \text{ chains/nm}^2$  and wide range of molecular weight of the graft chains (abstract). The presence of PMMA makes the density high and density of chains composing the polymer brush layer is  $0.4 \text{ chains/nm}^2$  as taught by Yamamoto. Sato discloses methacrylate monomers have been prepared and their radical polymerization behaviors have been studied as they show high reactivities of the methacrylate groups in radical polymerization, EMO, a methacrylate monomer carrying an oxetane group is expected to show high polymerizabilities in radical and cationic polymerization (Introduction). The 3-methyl-3-methacryloyloxy methyloxetane (EMO), which corresponds to the formula 53-54 of claim 8. The motivation of using the high density polymer brushes such as PMMA is to have strong resistance against

compression with an extremely high graft density (conclusion, last 3 lines) and motivation of using the crosslinkable functional group such as 3-methyl-3-methacryloyloxy methyloxetane is that it has high reactivities and shows high polymerizabilities in radical and cationic polymerization (Introduction)

28. In light of the motivation of using the polymer brush layer with a density of chains of 0.4 chains/nm<sup>2</sup> as taught by Yamamoto and using the crosslinkable functional group such as 3-methyl-3-methacryloyloxy methyloxetane in the coating composition as taught by Maruyama as described above, it therefore would have been obvious to one of ordinary skill in the art at the time of invention to use the polymer brush layer with such density, include benzyl methacrylate-PMMA, in Walt to have strong resistance against compression with an extremely high graft density and using a crosslinkable functional group such as 3-methyl-3-methacryloyloxy methyloxetane of Sato and replaced with the crosslinkable functional group such as benzyl-methacrylate of Walt to form a hollow polymer particles that would have high reactivities and high polymerizabilities.

29. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Walt et al. (US 2002/0172716), Yamamoto et al. ("Surface Interaction Forces of Well Defined, High Density Polymer Brushes Studied by Atomic Force Microscopy. 1. Effect of Chain Length", July, 6, 2000), Watanabe et al. (US 2005/0113505) and Dumain (US 2002/0065369).



30. Regarding claim 9, Walt discloses a core-shell microsphere compositions, hollow polymeric microsphere, where the microsphere are characterized as having a polymeric shell with consistent shell thickness (abstract). Walt also discloses that the hollow polymer microsphere were prepared by coating silica microsphere templates with poly (benzyl meth acrylate) using surface initiated controlled/living radical polymerization (para 0039). The microsphere shell typical contains styrene, methacrylate and the shell contains a polymer resulting from the polymerization of one or more monomers selected from styrene-methacrylate, benzyl methacrylate-PMMA, poly methyl methacrylate would be a non-crosslinkable monomer and would correspond to formula 60 of claim9. The strength and the durability of the polymeric shell is increased by crosslinking polymer chains (para 0011). The benzyl methacrylate will be the crosslinkable monomer having a crosslinkable functional group located on the innermost of the polymer brush layer and the PMMA will be non-crosslinkable monomer of the present application. However, Walt does not expressly mention that the polymer is high density polymer brush layer and the crosslinkable functional group represent by the formula 57-58 or 59 and a polyfunctional compound as claimed. Whereas, Yamamoto discloses a polymer brushes comprised of low-polydispersity poly (methyl methacrylate) (PMMA) chains densely end grafted on a silicon substrate by living radical polymerization, these brushes are characterized by an exceptionally high nearly constant graft density

approximately 0.4 chains/nm<sup>2</sup> and wide range of molecular weight of the graft chains (abstract). The presence of PMMA makes the density high and density of chains composing the polymer brush layer is 0.4 chains/nm<sup>2</sup> as taught by Yamamoto. Watanabe et al. discloses a hollow polymer particles obtained by emulsion polymerizing a crosslinkable polymerizable monomer composition and containing a crosslinkable monomer component and a hydrophilic monomer component (abstract). Example of hydrophilic monomer is N,N'-dimethylaminoethyl methacrylate (para 0057), which corresponds to the functional group such as aminoalkylene group and corresponds to formula 57, 59 of claim 9. Dumain discloses a low gloss powder coating composition comprising a glycidyl containing acrylic polymer, a first acid functional crosslinking agent comprising a copolymer of an ethylenically unsaturated compound and an anhydride of a dicarboxylic acid and a second acid functional crosslinking agent comprising a dicarboxylic acid having 4 to 20 carbon atoms (abstract). Dumain discloses that the second acid functional crosslinking dicarboxylic acid includes sebacic acid, which corresponds to presently claimed formula 75. The motivation of using the high density polymer brushes such as PMAA is to have strong resistance against compression with an extremely high graft density (conclusion, last 3 lines) and the motivation for having a functional group such as N,N'-dimethylaminoethyl methacrylate along with the crosslinkable monomer in the hollow particle is to form a hollow particle which is excellent in hardness,

mechanical strength, heat resistance and solvent resistance and exhibit high coating property and shielding property (para 0024) and motivation of having a polyfunctional compound such as dicarboxylic acid such as sebacic acid in the coating composition to form a coating composition that exhibits excellent resistance to degradation and has low glass (para 0001) and results in increased durability (para 0016)

31. In light of the motivation of using the polymer brush layer with a density of chains of 0.4 chains/nm<sup>2</sup> as taught by Yamamoto and using the crosslinkable functional group such as 3-methyl-3-methacryloyloxy methyloxetane in the coating composition as taught by Maruyama as described above, it therefore would have been obvious to one of ordinary skill in the art at the time of invention to use the polymer brush layer with such density, include benzyl methacrylate-PMMA, in Walt to have strong resistance against compression with an extremely high graft density and having a functional group such as N,N'-dimethylaminoethyl methacrylate along with the crosslinkable monomer of Watanabe in the hollow particle is to form a hollow particle which is excellent in hardness, mechanical strength, heat resistance and solvent resistance and exhibit high coating property and shielding property (para 0024) and including a first and second acid functional crosslinking agents such as methyl methacrylate and sebacic acid along with glycidyl containing acrylic polymer to increase

durability and low gloss of the coating composition due to synergic effect of the first and second crosslinking agents (para 0016).

### **CONCLUSION**

32. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RONAK PATEL whose telephone number is (571)270-1142. The examiner can normally be reached on Monday to Thursday 8 AM EST to 6PM EST.

33. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Callie Shosho can be reached on 571-272-1123. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

34. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/R. P./  
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11/20/2009

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